

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

Claims 1-19 (canceled).

Claim 20 (new): A surface acoustic wave device comprising:

a piezoelectric substrate made of LiNbO_3 having an electromechanical coupling coefficient whose square (k^2) is at least about 0.025;

at least one electrode made of one of a metal whose density is greater than that of Al, an alloy primarily including the metal or that is composed of laminated films made of a metal whose density is greater than that of Al or an alloy primarily including the metal and another metal, the at least one electrode being disposed on the piezoelectric substrate;

a first insulating layer disposed in a region other than a region where said at least one electrode is disposed, a thickness of the first insulating layer being substantially equal to that of the at least one electrode; and

a second insulating layer covering the at least one electrode and the first insulating layer; wherein

a density of the at least one electrode is at least about 1.5 times greater than that of the first insulating layer.

Claim 21 (new): The surface acoustic wave device according to Claim 20, wherein the first and second insulating layers are made of SiO_2 .

Claim 22 (new): The surface acoustic wave device according to Claim 20, wherein reflection of surface acoustic waves is used in the surface acoustic wave device.

Claim 23 (new): The surface acoustic wave device according to Claim 20, wherein a height of a convex portion on a surface of the second insulating layer is about 0.03λ or less when the wavelength of a surface acoustic wave is λ .

Claim 24 (new): The surface acoustic wave device according to Claim 20, wherein a height of a convex portion on the second insulating layer is about $1/2$ or less of the thickness of the electrode.

Claim 25 (new): The surface acoustic wave device according to Claim 24, wherein the height of the convex portion on the second insulating layer is about $1/3$ or less of the thickness of the electrode.

Claim 26 (new): The surface acoustic wave device according to Claim 20, wherein the electrode primarily includes a metal heavier than Al.

Claim 27 (new): The surface acoustic wave device according to Claim 26, wherein the electrode primarily includes a metal selected from a group consisting of Au, Pt, Cu, Ta, W, Ag, Ni, Mo, NiCr, Cr, and Ti.

Claim 28 (new): The surface acoustic wave device according to Claim 27, wherein the electrode is made of one of Au and Pt and a thickness thereof is in the

range of about 0.0017λ to about 0.06λ when the wavelength of a surface acoustic wave is λ .

Claim 29 (new): The surface acoustic wave device according to Claim 27, wherein the electrode primarily includes a metal selected from a group consisting of Au, Ag, Ni, Mo, Zn, Cu, Pt, Ta, W, Cr, and Ti, and the thickness of the electrode is in the range shown in the following Table 1 when the wavelength of a surface acoustic wave is λ :

Table 1

Au	$0.0017\lambda \sim 0.06\lambda$
Pt	$0.0017\lambda \sim 0.06\lambda$
Ag	$0.0035\lambda \sim 0.10\lambda$
Ta	$0.0025\lambda \sim 0.064\lambda$
W	$0.0035\lambda \sim 0.06\lambda$
Cu	$0.0058\lambda \sim 0.11\lambda$
Ni	$0.012\lambda \sim 0.12\lambda$
Cr	$0.012\lambda \sim 0.12\lambda$
Ti	$0.012\lambda \sim 0.12\lambda$
Mo	$0.012\lambda \sim 0.12\lambda$
Zn	$0.012\lambda \sim 0.12\lambda$

Claim 30 (new): The surface acoustic wave device according to Claim 20, wherein a thickness of the second insulating layer is in the range of about 0.15λ to about 0.4λ when the wavelength of a surface acoustic wave is λ .

Claim 31 (new): The surface acoustic wave device according to Claim 30, wherein the thickness of the second insulating layer is in the range of about 0.2λ to about 0.3λ .

Claim 32 (new): The surface acoustic wave device according to Claim 20, wherein Euler angles of the piezoelectric substrate made of LiNbO_3 are in any of the ranges shown in the following Table 2:

Table 2

Euler angles
$(0 \pm 5, 62 \sim 167, 0 \pm 10)$
$(0 \pm 5, 87 \sim 158, 20 \pm 10)$
$(0 \pm 5, 112 \sim 165, 80 \pm 10)$
$(0 \pm 5, 107 \sim 167, 100 \pm 10)$
$(10 \pm 5, 110 \sim 162, 80 \pm 10)$
$(10 \pm 5, 69 \sim 108, 100 \pm 10)$
$(10 \pm 5, 72 \sim 140, 160 \pm 10)$
$(20 \pm 5, 99 \sim 121, 160 \pm 10)$
$(30 \pm 5, 67 \sim 113, 0 \pm 10)$
$(30 \pm 5, 27 \sim 125, 140 \pm 10)$
$(30 \pm 5, 67 \sim 103, 160 \pm 10)$

Claim 33 (new): The surface acoustic wave device according to Claim 32, wherein Euler angles of the piezoelectric substrate made of LiNbO_3 are in any of the ranges shown in the following Table 3:

Table 3

$k_R^2 \leq 0.01$
$(0 \pm 5, 80 \sim 160, 0 \pm 10)$
$(0 \pm 5, 100 \sim 142, 0 \pm 10)$
$(0 \pm 5, 112 \sim 165, 80 \pm 10)$
$(0 \pm 5, 107 \sim 167, 100 \pm 10)$
$(10 \pm 5, 123 \sim 158, 80 \pm 10)$
$(10 \pm 5, 74 \sim 90, 100 \pm 10)$
$(10 \pm 5, 87 \sim 128, 160 \pm 10)$
$(20 \pm 5, 99 \sim 119, 160 \pm 10)$
$(30 \pm 5, 82 \sim 98, 0 \pm 10)$
$(30 \pm 5, 28 \sim 53, 140 \pm 10)$
$(30 \pm 5, 70 \sim 103, 160 \pm 10)$

Claim 34 (new): The surface acoustic wave device according to Claim 33, wherein Euler angles of the piezoelectric substrate made of LiNbO_3 are in any of the ranges shown in the following Table 4:

Table 4

$k_R^2 \leq 0.049$
(0 ± 5 , $88 \sim 117$, 0 ± 10)
(0 ± 5 , $115 \sim 124$, 0 ± 10)
(0 ± 5 , $115 \sim 135$, 80 ± 10)
(0 ± 5 , $109 \sim 157$, 100 ± 10)
(10 ± 5 , $130 \sim 146$, 80 ± 10)
(10 ± 5 , $80 \sim 87$, 100 ± 10)
(10 ± 5 , $98 \sim 118$, 160 ± 10)
(20 ± 5 , $110 \sim 118$, 160 ± 10)
(30 ± 5 , $86 \sim 94$, 0 ± 10)
(30 ± 5 , $33 \sim 47$, 140 ± 10)
(30 ± 5 , $77 \sim 103$, 160 ± 10)

Claim 35 (new): The surface acoustic wave device according to Claim 20, wherein Euler angles of the piezoelectric substrate made of LiNbO_3 are in any of the ranges shown in the following Table 5:

Table 5

Euler angles
(0 ± 5 , 38 ± 10 , 0)
(0 ± 5 , 89 ± 10 , $77 \sim 102 \pm 5$)
(0 ± 5 , 130 ± 10 , 79 ± 5)
(10 ± 5 , 110 ± 10 , $50 \sim 80 \pm 5$)
(10 ± 5 , 110 ± 10 , 106 ± 5)
(20 ± 5 , 100 ± 10 , $35 \sim 72 \pm 5$)
(20 ± 5 , 100 ± 10 , $100 \sim 110 \pm 5$)
(30 ± 5 , 89 ± 10 , $40 \sim 80 \pm 5$)
(30 ± 5 , 100 ± 10 , $40 \sim 117 \pm 5$)

Claim 36 (new): The surface acoustic wave device according to Claim 35, wherein Euler angles of the piezoelectric substrate made of LiNbO_3 are in any of the ranges shown in the following Table 6:

Table 6

Euler angles
$(0 \pm 5, 38 \pm 10, 0)$
$(0 \pm 5, 89 \pm 10, 80 \sim 100 \pm 5)$
$(10 \pm 5, 110 \pm 10, 50 \sim 80 \pm 5)$
$(20 \pm 5, 100 \pm 10, 42 \sim 70 \pm 5)$
$(30 \pm 5, 89 \pm 10, 42 \sim 76 \pm 5)$
$(30 \pm 5, 100 \pm 10, 42 \sim 72 \pm 5)$

Claim 37 (new): A surface acoustic wave device comprising:
a piezoelectric substrate made of LiNbO_3 ;
at least one electrode disposed on the piezoelectric substrate;
a protective metal film made of a metal or alloy that is more corrosion-resistant than a metal or alloy included in the electrode, the protective metal film being disposed on the electrode;
a first insulating layer disposed in a region other than a region where said at least one electrode is disposed, a thickness of the first insulating layer being substantially equal to a total thickness of the at least one electrode and the protective metal film; and
a second insulating layer covering the protective metal film and the first insulating layer.

Claim 38 (new): The surface acoustic wave device according to Claim 37, wherein an average density of an entire laminated structure including the at least one

electrode and the protective metal film is at least about 1.5 times greater than the density of the first insulating layer.

Claim 39 (new): The surface acoustic wave device according to Claim 37, wherein the first and second insulating layers are made of SiO₂.

Claim 40 (new): The surface acoustic wave device according to Claim 37, wherein reflection of surface acoustic waves is used in the surface acoustic wave device.

Claim 41 (new): The surface acoustic wave device according to Claim 37, wherein a height of a convex portion on a surface of the second insulating layer is about 0.03λ or less when the wavelength of a surface acoustic wave is λ .

Claim 42 (new): The surface acoustic wave device according to Claim 37, wherein a height of a convex portion on the second insulating layer is about 1/2 or less of the thickness of the electrode.

Claim 43 (new): The surface acoustic wave device according to Claim 42, wherein the height of the convex portion on the second insulating layer is about 1/3 or less of the thickness of the electrode.

Claim 44 (new): The surface acoustic wave device according to Claim 37, wherein the electrode primarily includes a metal heavier than Al.

Claim 45 (new): The surface acoustic wave device according to Claim 44, wherein the electrode primarily includes a metal selected from a group consisting of Au, Pt, Cu, Ta, W, Ag, Ni, Mo, NiCr, Cr, and Ti.

Claim 46 (new): The surface acoustic wave device according to Claim 45, wherein the electrode is made of one of Au and Pt and a thickness thereof is in the range of about 0.0017λ to about 0.06λ when the wavelength of a surface acoustic wave is λ .

Claim 47 (new): The surface acoustic wave device according to Claim 45, wherein the electrode primarily includes a metal selected from a group consisting of Au, Ag, Ni, Mo, Zn, Cu, Pt, Ta, W, Cr, and Ti, and the thickness of the electrode is in the range shown in the following Table 1 when the wavelength of a surface acoustic wave is λ :

Table 1

Au	$0.0017\lambda \sim 0.06\lambda$
Pt	$0.0017\lambda \sim 0.06\lambda$
Ag	$0.0035\lambda \sim 0.10\lambda$
Ta	$0.0025\lambda \sim 0.064\lambda$
W	$0.0035\lambda \sim 0.06\lambda$
Cu	$0.0058\lambda \sim 0.11\lambda$
Ni	$0.012\lambda \sim 0.12\lambda$
Cr	$0.012\lambda \sim 0.12\lambda$
Ti	$0.012\lambda \sim 0.12\lambda$
Mo	$0.012\lambda \sim 0.12\lambda$
Zn	$0.012\lambda \sim 0.12\lambda$

Claim 48 (new): The surface acoustic wave device according to Claim 37, wherein a thickness of the second insulating layer is in the range of about 0.15λ to about 0.4λ when the wavelength of a surface acoustic wave is λ .

Claim 49 (new): The surface acoustic wave device according to Claim 48, wherein the thickness of the second insulating layer is in the range of about 0.2λ to about 0.3λ .

Claim 50 (new): The surface acoustic wave device according to Claim 37, wherein Euler angles of the piezoelectric substrate made of LiNbO_3 are in any of the ranges shown in the following Table 2:

Table 2

Euler angles
$(0 \pm 5, 62 \sim 167, 0 \pm 10)$
$(0 \pm 5, 87 \sim 158, 20 \pm 10)$
$(0 \pm 5, 112 \sim 165, 80 \pm 10)$
$(0 \pm 5, 107 \sim 167, 100 \pm 10)$
$(10 \pm 5, 110 \sim 162, 80 \pm 10)$
$(10 \pm 5, 69 \sim 108, 100 \pm 10)$
$(10 \pm 5, 72 \sim 140, 160 \pm 10)$
$(20 \pm 5, 99 \sim 121, 160 \pm 10)$
$(30 \pm 5, 67 \sim 113, 0 \pm 10)$
$(30 \pm 5, 27 \sim 125, 140 \pm 10)$
$(30 \pm 5, 67 \sim 103, 160 \pm 10)$

Claim 51 (new): The surface acoustic wave device according to Claim 50, wherein Euler angles of the piezoelectric substrate made of LiNbO_3 are in any of the ranges shown in the following Table 3:

Table 3

$k_R^2 \leq 0.01$
(0±5, 80~160, 0±10)
(0±5, 100~142, 0±10)
(0±5, 112~165, 80±10)
(0±5, 107~167, 100±10)
(10±5, 123~158, 80±10)
(10±5, 74~90, 100±10)
(10±5, 87~128, 160±10)
(20±5, 99~119, 160±10)
(30±5, 82~98, 0±10)
(30±5, 28~53, 140±10)
(30±5, 70~103, 160±10)

Claim 52 (new): The surface acoustic wave device according to Claim 51, wherein Euler angles of the piezoelectric substrate made of LiNbO₃ are in any of the ranges shown in the following Table 4:

Table 4

$k_R^2 \leq 0.049$
(0±5, 88~117, 0±10)
(0±5, 115~124, 0±10)
(0±5, 115~135, 80±10)
(0±5, 109~157, 100±10)
(10±5, 130~146, 80±10)
(10±5, 80~87, 100±10)
(10±5, 98~118, 160±10)
(20±5, 110~118, 160±10)
(30±5, 86~94, 0±10)
(30±5, 33~47, 140±10)
(30±5, 77~103, 160±10)

Claim 53 (new): The surface acoustic wave device according to Claim 37, wherein Euler angles of the piezoelectric substrate made of LiNbO₃ are in any of the ranges shown in the following Table 5:

Table 5

Euler angles
$(0 \pm 5, 38 \pm 10, 0)$
$(0 \pm 5, 89 \pm 10, 77 \sim 102 \pm 5)$
$(0 \pm 5, 130 \pm 10, 79 \pm 5)$
$(10 \pm 5, 110 \pm 10, 50 \sim 80 \pm 5)$
$(10 \pm 5, 110 \pm 10, 106 \pm 5)$
$(20 \pm 5, 100 \pm 10, 35 \sim 72 \pm 5)$
$(20 \pm 5, 100 \pm 10, 100 \sim 110 \pm 5)$
$(30 \pm 5, 89 \pm 10, 40 \sim 80 \pm 5)$
$(30 \pm 5, 100 \pm 10, 40 \sim 117 \pm 5)$

Claim 54 (new): The surface acoustic wave device according to Claim 53, wherein Euler angles of the piezoelectric substrate made of LiNbO_3 are in any of the ranges shown in the following Table 6:

Table 6

Euler angles
$(0 \pm 5, 38 \pm 10, 0)$
$(0 \pm 5, 89 \pm 10, 80 \sim 100 \pm 5)$
$(10 \pm 5, 110 \pm 10, 50 \sim 80 \pm 5)$
$(20 \pm 5, 100 \pm 10, 42 \sim 70 \pm 5)$
$(30 \pm 5, 89 \pm 10, 42 \sim 76 \pm 5)$
$(30 \pm 5, 100 \pm 10, 42 \sim 72 \pm 5)$